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78-10196
CR-157386

Quarterly Progress Report
HCMM Contract
with the
U. S. Water Conservation Laboratory

1. Order No.: S-40255B

2. Principal Investigator: Ray D. Jackson
U. S. Water Conservation Laboratory
4331 E. Broadway
Phoenix, Arizona 85040

3. Period of Report: 1 MAY to 31 JULY 78

4. Description:

a. General.--Strong, dry, north winds during the first two weeks in May accelerated the ripening and drying of the barley at the Dunnigan test site. By 15 May 78, the gravimetric water content of the grain was 0.25 to 0.30. Our plans were to harvest when the water content reached about 0.15.

On 22 May 78, we started hand harvesting at the experimental sites within the 720-acre field. We removed all plants from 20, one-meter squares at each of the sites, counted the number of heads in each square meter, and bagged all samples for further processing. Five consecutive "squares" were taken in each of the four cardinal directions, starting one meter from where we normally stood to take plant temperatures. The 20 samples at each site were, therefore, from the areas where plant temperatures were taken throughout the season. By 26 May, all sites but one were harvested.

Following harvest, all samples (300 of them) were threshed, the number of seeds from each sample was counted, and their weight and water content determined. From these data the following information was obtained:

1. Seed water content
2. Number of heads per square meter
3. Number of seeds per head
4. Number of seeds per square meter
5. Bushel weight of barley
6. Yield

Items 5 and 6 were corrected to a seed water content of 0.125 to allow comparisons of yield between sites.

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(E78-10196) HEAT CAPACITY MAPPING MISSION
Quarterly Progress Report, 1 May - 31 Jul.
1978 (Agricultural Research Service) 3 p
HC A02/MF A01

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The highest yielding plot was R4, a 20° slope to the south, with 417.5 gm^{-2}, and the lowest yielding plot was R1, a weed-infested flat area plagued with a high water table, with 104.5 gm^{-2}. The average yield for the 15 sites was 290.7 gm^{-2}. The grower reported a yield of 267.8 gm^{-2}, only 8% lower than our average. All ground-based data are in the process of being reduced and analyzed.

Much of the airborne thermal scanner data have been processed, but detailed analyses are yet to be completed. One striking feature of the airborne thermal imagery is that there are significant temperature differences (4C to 8C) depending on the direction of flight of the aircraft (north-south vs east-west). The differences are more pronounced where the topography is uneven as compared to more level areas.

For mid-May overflights, the warmer surfaces appear to be those which are at nadir to the line scanner. The flights took place about one hour past solar noon which would result in the west- and south-facing slopes being warmer than the east- and north-facing slopes. Indeed, this is what the images show. Whether this phenomenon can be observed under less sunny conditions, or different times of the year, or at various stages of growth of the barley, or on bare soil (wet or dry) remains to be seen. This problem of the uniqueness of thermal data depending on direction of the line scanner-acquired data deserves special attention. Further analysis should yield significant information.

On 15 May, the HCMM was to be operating as it passed over. Aircraft thermal scanner and ground thermal data were obtained at the same time as the satellite. The day was somewhat cloudy so the data may not be good. On 16 May, U2 and low altitude (4000-ft) aircraft flights were made at 0406 and 1230. The day was clear. On 20 May, a clear day, low altitude aircraft data were obtained near the time of the HCMM passes (0213 and 1315). Post harvest flights were made on 6 and 16 June, and 13 July, coincident with HCMM passes.

b. Problems.--No major problems other than HCMM data were obtained only for the last few days of the season when all plants were ripe. This was the result of the several postponements in the launch date.

c. Accomplishments.--None as yet.

d. Significant Results.--None as yet.

e. Publications.--None as yet.

f. Recommendations.--None.

g. Funds expended.--$6933, this period; $42,359 total since 1 NOV 77.

h. Data utility.--No spacecraft data available.

Submitted by:

Ray D. Jackson
Principal Investigator.

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